

80 Nature's Recyclers



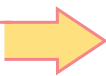
You have learned about the roles of producers and consumers in a food web. But what about worms, bacteria, and fungi? What role do they play within an ecosystem? Organisms that eat dead organisms and wastes from living organisms are known as **decomposers**. Worms, bacteria, and fungi are decomposers. You can think of decomposers as a special type of consumer: they consume dead organisms and waste material.



Fungi such as these decompose wood and other dead plant material.

Decomposers like worms and bacteria can seem unimportant. The decay they cause can look (and smell) horrible. But decomposers are essential to the ability of ecosystems to recycle important nutrients like carbon and nitrogen. Decomposers like bacteria and fungi break down dead matter into chemicals that can be absorbed by plants. Without decomposers, dead organisms would pile up and the nutrients they contain could not be re-used by plants. Eventually, the fertility of soil and aquatic ecosystems would be reduced to nothing. Imagine what the bottom of a lake would look like without any decomposers!

CHALLENGE



Where can you find some decomposers? What do these decomposers look like?

MATERIALS



For each group of four students

- 1 soil sample
- 1 nematode extractor
- 1 clamp
- 1 piece of tubing
- 1 large piece of filter paper
- 1 cup of water



For each pair of two students

- 1 microscope
- 1 microscope slide
- 1 coverslip
- 1 dropper

PROCEDURE

Part A: Investigating Soil



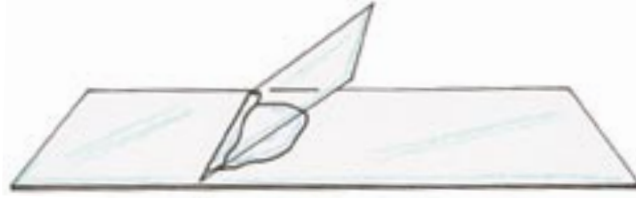
NEMATODE EXTRACTOR

1. Gather $\frac{1}{2}$ cup of soil from outdoors by scraping or shaking moist soil from around the roots of a clump of grass or other plant or from an area of decomposing leaf litter.
2. Place the tubing on the spout of the funnel. Then attach the clamp onto the middle of the tubing, as shown at left. Make sure that the tubing is pushed as far as it can go into the clamp; otherwise the water can drip out.
3. Place the funnel in the stand and the perforated disc into the funnel.
4. Add water to the funnel to the level of the perforated disc.
5. Put a single layer of filter paper in the funnel. You may need to separate the layers. Add a layer of your soil sample, no more than 1 cm deep, onto the filter paper.
6. Fold the filter paper over the soil. Add just enough water to cover the soil and filter paper. Set aside for one day.

Part B: Searching for Nematodes

7. Carefully remove the clamp to release a small amount (less than 5 mL) of water into the cup. Share this sample in your group of four.
8. You might be able to see some small, white thread-like objects in the water. Try to suck up one of the thread-like objects into the dropper. Then squeeze a couple of drops from the dropper onto a microscope slide.

9. Carefully touch one edge of the coverslip, at an angle, to the mixture. Slowly allow the coverslip to drop into place.



10. Begin by observing the slide on low power (usually the 4x objective). Be sure that the sample is in the center of the field of view (you may need to move the slide slightly) and completely in focus before going on to the next step.

Hint: To check that you are focused on the sample, move the slide slightly while you look through the eyepiece—the sample that you are focused on should move as you move the slide.

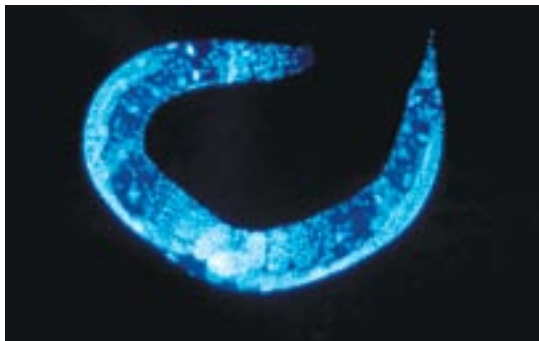
11. Without moving the slide, switch to medium power (usually the 10x objective). Adjust the microscope settings as necessary.

Hint: If material on the slide is too dark to see, increase the amount of light on the slide: do this by slightly opening the diaphragm under the stage.

12. While looking through the eyepiece, move the slide around slowly so that you see all parts of your sample. As you scan the slide, look for movement, especially of thin, colorless organisms like the ones shown in the photo below. These organisms look like small earthworms, but are actually members of a different phylum. These tiny worms are called nematodes (NEM-uh-toads). (If you do not find any nematodes on your slide, make another slide from your sample.)

13. Try to count the number of nematodes on your slide. Compare the number of nematodes you and your partner find with the rest of your group.

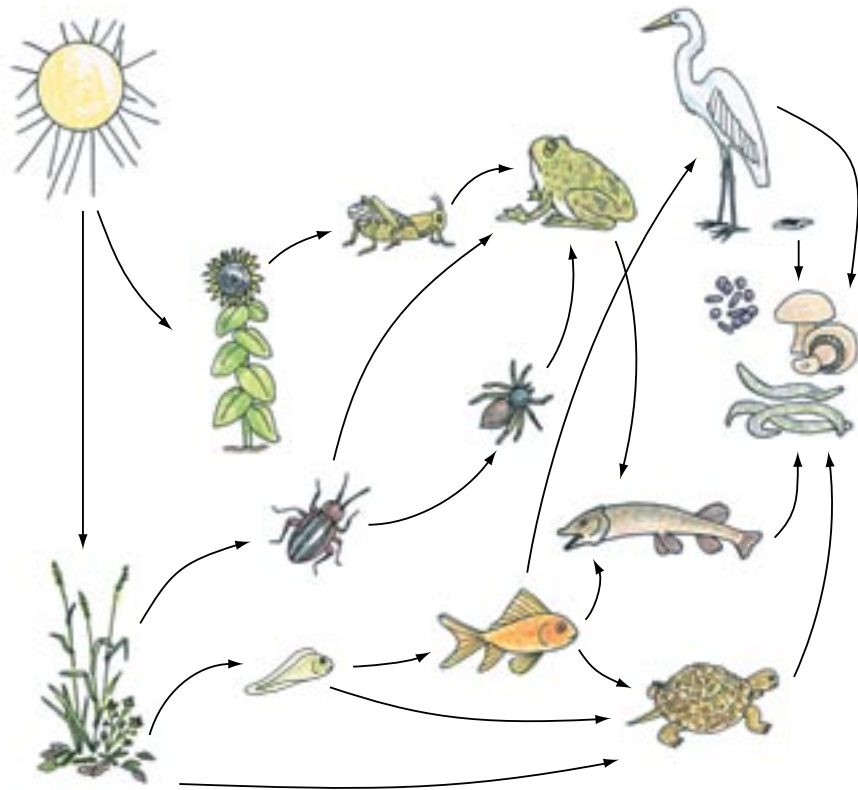
14. When you have completed your observations, turn off the microscope light and set the microscope back to low power.



A Nematode

ANALYSIS

1. Think about where some nematodes are found. What do you think they eat? Describe the role of nematodes in the ecosystem.
2. a. A simplified food web is shown below. Which of the organisms in this ecosystem are producers? Which are consumers? Which are decomposers?
b. Use the food web to explain why decomposers could be considered a special type of consumer.



3. Like all organisms, birds like the egret need energy to live. Explain how the original source of energy for egrets, and all other consumers, is the sun.
4. Imagine that something kills most of the bacteria and other decomposers in a lake. What are some possible effects of killing these decomposers?



EXTENSION

To learn more about food webs and explore different food webs, go to the *Issues and Life Science* page of the SEPUP website.